

Amateur Radio Networks and the Internet

Many in amateur radio see the internet as a fabulous "support" mechanism for the hobby, useful for sending around bulletins, thousands of individual ham-radio-related web pages, discussion groups, software distribution, etc. I feel that to restrict the internet to that role is to lose a tremendous capability. It's my strong feeling that amateur radio should wholeheartedly *embrace* the internet and its capabilities, and do so *directly* rather than indirectly.

Content

The first reason why I feel this way is *content*. Simply put, left to its own internal content, amateur radio digital content isn't that exciting overall. That said, there are pockets of interesting content out there, but not much. I'd guess that a lot of packet radio networks and servers (BBSes) were taken out of service for just that reason; the content wasn't compelling enough to justify the time and effort required to access it (for example, maintaining a packet BBS for "For Sale" notices, etc.). Late last year I logged on to a BBS for the first time in several years, and was appalled at the crude user interface, but even more appalled at the uninteresting content. If that were the only thing I could access through my TNC, I'd probably not bother, and it's my guess that's why a lot of folks want to do so.

Of course, there is the "build it and they will come"/"build it for the love of building it" faction that keeps servers (and repeaters) up because they like it, but they have very few users. For the rest, though, it's a lot more fun to build or use something that takes some effort if there's some interesting *use* for it.

In contrast, the amateur radio content on the internet is far more interesting. There are numerous mailing lists and news groups, web pages, etc. Some would argue that's the internet, not amateur radio. I'd agree, except that the content to which I'm referring is *about* amateur radio, and it happens to be *located* on the internet. Why not combine the two? Many groups do exactly

this with their packet networks and servers—distribute amateur-radio-related content via amateur radio. Yes, it's a bit more of a challenge to get it (log onto a BBS, learn how to configure a personal station to accept e-mail directly, etc.), but there's sufficient reward (the interesting content) to make it worth the effort.

Some argue that this makes amateur radio just another part of the internet. To some extent that's true and illustrates nicely one of the key strengths of TCP/IP: It works over any transport mechanism—RS-232 cable, Ethernet, fiber, wireless, laser, satellite, etc. Some hams feel strongly that amateur radio is "just another network" that is part of the internet. Others don't think there should be any content or other interconnection with the internet. I'm more middle-of-the-road; I think that internet content and "services" that pertain to amateur radio should be encouraged to be accessible from amateur radio. I think that's a fair and reasonable balance between the two viewpoints. Realistically, however, this is an all-or-nothing proposition; access to internet content can't be selective (although many, many will try). If the capability exists, some will use it for non-selectively and access non-amateur-radio content from their internet connection. On the whole, I think that amateur radio is far more strengthened than damaged by interconnection of the internet and amateur radio networks.

Relevance

For me, the most powerful argument for having interoperability between the internet and amateur radio networks is relevance. The Internet is successful beyond all comprehension, including the wildest imaginations of its designers. It is changing life daily, and for many is more relevant in daily life than the telephone or the television. Ask the students who have 10 Mbps internet access from their dorm if they'd rather have a phone, television, or a laptop. My guess is that you'll hear laptop far, far more frequently than television or phone. To have interconnection with the internet makes amateur radio relevant to many, especially the younger crowd.

Put another way, which of the following phrases do you think will more interest a teenager: "Want to learn more about amateur packet radio?" or "Want to learn about wireless internet access you can experiment with?"

Think hard about this...If amateur radio isn't relevant to the younger generations, then it will inevitably die out. Internet use is increasingly becoming the dominant communications technology of young people's lives (behind only cell phones, pagers, and "hanging together"). We would be foolish not to embrace that trend and figure out how to make effective use of it.

Solves Nagging Problems

Internet interconnection with amateur radio networks solves a lot of nagging problems. One example is that wide-area networks using amateur radio exclusively is very tough to do. It's one thing to put up a few nodes and quite another to maintain them and repair them when they fail. In a lot of areas there simply aren't enough hams, enough sites, or enough money to put up a network. It seems to me that instead of "punting" and going completely commercial in that situation, a reasonable compromise would be to do as much of the network as is practical with amateur radio, and then treat the internet as a "tunnel" between other amateur radio networks. Some feel "well... just use HF as the link." Bad idea. HF isn't fast enough to keep up, and HF spectrum is too precious (and too interesting to use in other ways) to dedicate to such use.

Another nagging problem is incompatible networking standards in use in amateur radio. Simply put, the services and capabilities possible with the use of TCP/IP (and interconnection with the internet) far exceed the capabilities of "amateur radio" networking systems. TCP/IP can adapt easily to low bandwidth communications while remaining seamlessly interoperable with higher speed communications and internet interconnection.

As an aside, TCP/IP is often poorly implemented in amateur radio, which has resulted in something of a bad reputation. Admittedly it's tougher to get

TCP/IP running, and TCP/IP does have more overhead. For TCP/IP to work well, it really needs a high-quality channel. Speed of that channel is not nearly as important as the quality of the channel. In the Seattle area we have been using amateur radio TCP/IP exclusively for years. It does work very well, but we've had to invest a lot of time in learning how to do it right.

Technical Training

Most wireless (data) communications systems are now interoperable with the internet because customers are demanding it. Even receive-only pagers, about the simplest wireless data devices, are now internet-enabled and can receive e-mail and other internet-based content. Wireless phones are gaining "chat-mode" capabilities—for example, wireless messaging compatible with America Online's Instant Messenger service. Wireless-to-internet interconnection is one of the hottest trends in commercial wireless now, and it only makes sense to me that there's more justification in devoting time to amateur radio if doing so has the potential to enhance one's career skills. For those who are already employed in the wireless or internet areas, it seems to me that amateur radio is a perfect way to experiment with such concepts. Short messaging is in its infancy, and far from perfect (for example, it's not "reliable"; there's not much done when the message is transmitted to ensure that it's transmitted correctly or it reaches the destination); thus there's lots of room for innovation and improvement.

Emergency Services Support

I've observed that there has been much more interest of late in amateur radio TCP/IP, as it's become more widely understood that it's possible to transport "real e-mail" in an emergency. In this case, "real" means conventional SMTP/POP "internet" e-mail such as Eudora, Netscape Mail Client, Outlook Express, etc. (in contrast to amateur radio BBSes, e-mail, etc.), that most people use. In a lot of cases, if support organizations working through a disaster could use their e-mail systems, they would be much more effective. Ideally, support consists of a laptop computer and the usual packet radio equipment. The laptop has an Ethernet card in it and software installed that acts as a router between the Ethernet connection (connected to the LAN) and the packet radio network and its associated internet

gateway. With some very minor changes to the support organization's computers for the duration of the emergency (basically changing the default gateway setting to route through the router laptop), the organization can then send e-mail again via an amateur radio network—slower than what they're used to certainly, but very usable.

Some Examples

- The Microsoft Amateur Radio Club (www.microhams.com) came up with an incredibly good idea of streaming the audio of their new repeater via the internet. They can monitor the repeater from their computer with nothing more than the normal web browser and an internet connection. Of course it helped a lot that MicroHAMS was able to obtain "very reasonable terms" for the "streaming server" software, and they have plenty of bandwidth available with which to stream the audio. This is real "out of the box thinking," and it seems to me that this capability will be extremely popular. It's a very inexpensive way to find out what repeaters are all about (and how much *fun* they are) before investing in even minimal equipment.

- A number of repeaters have been linked using Voice Over IP (VOIP) technology, normally used for chatting between individuals and "free telephone," to form extended repeater networks. This gets really interesting when repeaters are linked on different continents. I easily can see this becoming huge, and linkages changing from month to month. What a fabulous way to get to know other hams in different areas, sharing ideas and swapping experiences over the relative intimacy of a repeater, contrasted with the much more sporadic nature of individual contacts over HF. (It is interesting to note that MicroHAMS' implementation of streaming audio points out a potentially different approach—connect up repeaters with streaming audio rather than VOIP.)

- Those who prefer to "lock down" their internet connection to allow connections only with other amateur radio operators will find Net 44/AMPRNet (www.ampr.org) very useful. Mirrorshades, a router at the University of California at San Diego, allows otherwise unconnected Net 44 amateur radio networks (those that make use of the 44.x.x.x IP address space) to "tunnel" or "encapsulate" Net 44 packets via the internet. Mirrorshades "un-encapsulates" the packets and "re-encapsulates" them for delivery to other Net 44

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networks. There is an extensive network of Net 44 gateways in operation.

- I mentioned in last month's column the Igate short message system developed for APRS. The more I learn about this system, the more impressed I am by its elegance and simplicity. Briefly, an Igate (APRS to internet gateway) connects to the master Igate server on the internet via a commercial internet connection of almost any kind (dial-up is adequate) and then listens to an APRS channel and basically repeats all packets heard on the APRS channel back to the master Igate server. The master Igate server then "echoes" those packets out to every other Igate server (via the internet connection). The Igate server compares short messages received from the internet with stations heard on the APRS channel. If there is a match (and *only* if there is a match) the short message is gatewayed onto the APRS channel. This system works because the bandwidth of the internet connection is so much higher than the amount of traffic being sent, and there is easily enough computing power to do

the comparisons and the message transmission. What impresses me is that a similar capability for Short Messaging is just now emerging in the commercial wireless phones, and that's a long way from being universal. The Igate system has its problems. It's very much a work in progress, but it illustrates perfectly why amateur radio should not attempt to "isolate" itself from the internet.

- It's long been a tradition in amateur radio to handle *personal* third-party messages. In the late 1990s and beyond that has come to mean e-mail a lot more than radiograms. There are a lot of people now, and for the foreseeable future, beyond the reach (operationally and especially financially) of commercial "thin route" e-mail access. Amateur radio is capable of bridging that gap well, and if the messages originate or terminate with a licensed amateur radio operator (assuming third-party rules are in place in the operator's country) and the message is of a personal nature, it seems to me that gateways should exist, assuming the prop-

er safeguards, to pass such messages largely automatically between amateur radio and the internet.

New Breed Amateur Radio Clubs (and Amateurs!)

I was really happy to see MicroHAMS come into existence. That was all the validation I needed that there *is* a place for amateur radio in the lives of those in technology fields who might feel that amateur radio is "hopelessly outdated." MicroHAMS illustrates some important trends in our hobby.

- The first is that such hams and organizations see amateur radio through their own unique perspective. For example, a highlighted club project is to build a simple 20 meter transceiver to be used exclusively for PSK31.

- I discussed the audio output of the repeater being transmitted via streaming audio technology, making it possible to anyone with internet access to listen to the repeater. I expect that it won't be long before a "reply" capability via a web browser is possible.

- Most of MicroHAMS' internal communication is done via the web page and e-mail mailing lists. Their meetings are very focused; it is likely that no "business" is conducted there (that's been handled via e-mail) and no paper newsletter is needed (It is assumed all members have web and e-mail access.).

- The activities of the club are at least somewhat relevant to the members' professional lives. Microsoft is a company that is intensely technical, and although wireless is currently not a large part of Microsoft's overall business, it is a very relevant area of interest to Microsoft.

- Most of all, and most profound, from all appearances, the members of MicroHAMS are having *fun*. That's a concept largely lost to a lot of amateur radio groups, where business meetings and other administrative trivia dominate the meetings, where the same old arguments dominate the discussions, and where not much *fun* is happening. That gets old after a while, and people generally decide that something that is truly optional in their lives and isn't much fun isn't worth doing, so they stop. We have lost a *lot* of hams that way.

In summary, the internet isn't the enemy. It's a fabulous tool that amateur radio can make use of to markedly enhance the hobby. Let's get busy!

Please let me know your story about cutting-edge amateur radio, including how your group has implemented internet interoperability.

73, Steve, N8GNJ

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